

CONTENTS

APPROVAL PAGE	
ORIGINALITY STATEMENT	
ABSTRACT	iv
PREFACE	v
ACKNOWLEDGE	vi
Contents	viii
List of Figures	xi
List of Tables	xiii
LIST OF APPENDICES	xiv
1 INTRODUCTION	1
1.1 Background	1
1.2 Formulation of Problems	2
1.3 Purpose of The Research	2
1.4 Scope of Problems	2
1.5 Research Methodology	3
1.6 Structure of Thesis	4
2 BASIC CONCEPT	5
2.1 WBAN	5
2.2 Planar Inverted-F Antenna	6
2.2.1 Resonance Frequency	7
2.2.2 Current Distribution	7
2.2.3 Bandwidth	7
2.2.4 Impedance Matching	8
2.2.5 Voltage Standing Wave Ratio	8
2.2.6 Return Loss	8
2.2.7 Antenna Feeding Circuit	9

2.3	Method to Produce Multi-band Frequencies	9
2.3.1	U-Slot Dimension	9
3	SYSTEM MODEL AND THE PROPOSED METHOD	11
3.1	System Design	11
3.2	Equipment Section	11
3.2.1	Hardware	11
3.2.2	Software	12
3.3	Antenna Design Process Flowchart	12
3.4	Material Section	13
3.5	Antenna Dimension	13
3.5.1	Antenna Patch Dimension	14
3.5.2	Antenna U-Slot Dimension	14
3.5.3	Antenna Ground Plane Dimension	15
3.5.4	Short Pin	15
3.5.5	Feeding Circuit	15
3.6	Antenna Simulation	16
3.7	Antenna Design Optimization	18
3.7.1	L-Shaped Slot Optimization	19
3.7.2	Short Pin Optimization	20
3.7.3	Height of Antenna Optimization	20
3.7.4	Slots on Ground plane	21
3.8	Final Result of Antenna Design	22
3.9	Result of Antenna Design Simulation	24
4	RESULTS AND ANALYSIS	27
4.1	Antenna Measurements Result	27
4.1.1	Return Loss Measurement	28
4.1.2	VSWR Measurement	30
4.2	Analysis of Measurement Result	31
4.2.1	Analysis of Return Loss and VSWR	31
4.2.2	Bandwidth Characteristic	32
4.2.3	Error Value	32
5	CONCLUSION AND SUGGESTION	34
5.1	Conclusion	34
5.2	Suggestion	34

Bibliography

APPENDICES

LIST OF FIGURES

2.1	WBAN Configuration	5
2.2	PIFA Antenna.	6
2.3	The Reactively-loaded Antenna Method.	9
3.1	Antenna System Block Diagram.	12
3.2	Design of PIFA.	13
3.3	Patch Antenna Dimension.	15
3.4	Adjusting Width and Length of Patch Dimension.	16
3.5	Return Loss of First Resonance Frequency.	17
3.6	Dual Frequency Return Loss.	17
3.7	Return Loss of Second Resonance Frequency.	18
3.8	Patch Dimension with L-shaped Slot.	19
3.9	L-shaped Slot Optimization.	19
3.10	Short Pin Optimization.	20
3.11	Height of Antenna Optimization.	21
3.12	Slot on The Ground Plane.	22
3.13	Width Slot of Ground Plane Optimization.	22
3.14	Final Result of Patch Design.	23
3.15	Final Result of Ground Plane Design.	24
3.16	Return Loss's Graph Simulation Result.	24
3.17	Bandwidth for 900 MHz Frequency.	25
3.18	Bandwidth for 2.4 GHz Frequency.	25
3.19	VSWR of First Resonance Frequency	26
3.20	VSWR of Second Resonance Frequency	26
4.1	PIFA Antenna Fabrication.	27
4.2	Vector Network Analyzer (VNA).	28
4.3	Return Loss Measurement.	28
4.4	Return Loss Measurement with Microsoft Excel.	29
4.5	Comparison Return Loss Results Between Simulation and Measurement.	29
4.6	VSWR Measurement with Microsoft Excel.	30
4.7	VSWR Measurement.	30

4.8 Comparison VSWR Results Between Simulation and Measurement. 31

LIST OF TABLES

3.1	Table of Material Specification.	13
3.2	Antenna Parameters.	14
3.3	Length of Antenna Parameters.	23
4.1	Comparison Result on First Resonance Frequency.	32
4.2	Comparison Result on Second Resonance Frequency.	32

LIST OF APPENEDICES

1. Fabrication at Plaza Jaya.
2. Design of Antenna's Simulation.
3. Measurement of VSWR and Return Loss with VNA.
4. Measurement Activity with VNA.
5. Antenna's Configuration on VNA.
6. Mr. Ruqman on PT. RTI, Assist and Guide The Measurement.
7. Oscillator to do the Radiation Pattern's Measurement Activity.
8. Oscillator.
9. Configuration Antenna's for Radiation Pattern Measurement.
10. Radiation Pattern's Activity.
11. Measurement Result on First Resonance Frequency.
12. Measurement Result on Second Frequency.